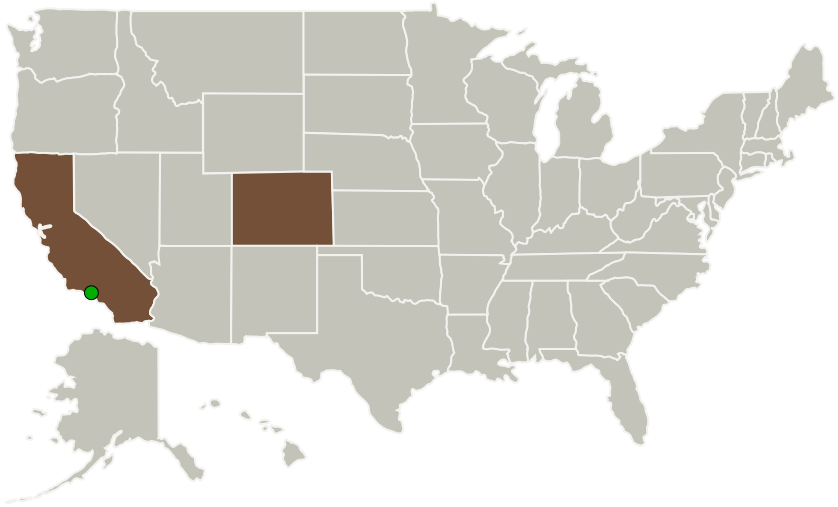
An ElectroAdhesive "Stick Boom" for Mars Sample Return Orbiting Sample Capture, Phase I

Completed Technology Project (2011 - 2011)

Project Introduction

The Electroadhesive "Sticky Boom", an innovative method for rendezvous and docking, is proposed for the Orbiting Sample Capture (OSC) portion of the Mars Sample Return (MSR) mission. This technology carries the advantages of greatly reducing the probability of accidental colisions, high inherent reliability from mechanical and guidance simplicity, lower propellant consumption, avoidance of plume impingement, high tolerance for relative spacecraft misalignment, very low mass and volume requirements, and reliable non-mechanical contact and proximity detection. The system consists of an electrically activated electroadhesive pad used for spacecraft capture, mounted flexibly on the end of a low volume/weight retractable boom. The research proposed in phase 1 aims to design a system optimized for MSR mission and demonstrate the reliable functionality of the system in simulated space environments raising the TRL from a 2 to a 3. This effort ends with a system design for a flight testbed for testing during Phase 2, thus further elevating the TRL to 5-6. Also covered are numerous other applications of the technology, which allows for docking with spacecraft not design for docking as well as capture of uncooperative targets and debris. Interest in application of this technology has been show by industry entities such as ULA.

Primary U.S. Work Locations and Key Partners



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Organizations Performing Work	Role	Type	Location
Altius Space Machines, Inc.	Lead Organization	Industry	Broomfield, Colorado
Jet Propulsion Laboratory(JPL)	Supporting Organization	NASA Center	Pasadena, California

Primary U.S. Work Locations	
California	Colorado

Project Transitions

February 2011: Project Start

September 2011: Closed out

Closeout Documentation:

- Final Summary Chart*(https://techport.nasa.gov/file/138002)*

Organizational Responsibility

Responsible Mission Directorate:

Space Technology Mission Directorate (STMD)

Lead Organization:

Altius Space Machines, Inc.

Responsible Program:

Small Business Innovation Research/Small Business Tech Transfer

Project Management

Program Director:

Jason L Kessler

Program Manager:

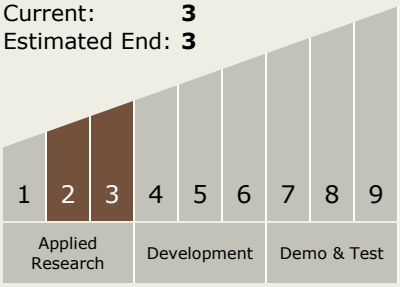
Carlos Torrez

Principal Investigator:

Jonathan A Goff

Technology Maturity (TRL)

Start: **2**
Current: **3**
Estimated End: **3**



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Technology Areas

Primary:

- TX04 Robotic Systems
  - TX04.5 Autonomous Rendezvous and Docking
    - TX04.5.5 Capture Mechanisms and Fixtures

Target Destinations

The Sun, Earth, The Moon, Mars, Others Inside the Solar System, Outside the Solar System